WFP Ref. No.: AR5, AR7, A20N, A4C
Last Updated: July 8, 1991

Location: Western North Atlantic Ocean and southern Labrador Sea.
Dates: 24 April - 24 May, 1991 (91-007)
26 May - 4 June, 1991 (91-015)
Ship: C.S.S. Hudson
Expocode: 18HU91007, 18HU91015
Cruise No./Leg: 91-007/ 91-015
Senior scientist(s): Dr. R.M. Hendry
Marine Services Division
Physical and Chemical Sciences Branch
Scotia-Fundy Region
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia
CANADA B2Y 4A2

Scientific project leader(s): Dr. R.M. Hendry
Dr. E.P. Jones
Dr. E.P.W. Horne

Itinerary Accomplished:

Dep: Dartmouth, N.S.	Arr: Julianehaab, Greenland
Wed. Apr 24, 1991	Fri. May 24, 1991
Julianehaab	Dartmouth
Sun. May 26, 1991	Tue. June 4, 1991

Summary of Purpose:

The primary purpose of Cruises 91-007 and 91-015 was to map the distribution of temperature, salinity and various chemical properties along selected sections in the western North Atlantic and southern Labrador Sea as part of the international World Ocean Circulation Experiment (WOCE) Hydrographic Program. The overall goal of this work is to better understand and model the role of ocean circulation and the associated transports of heat and fresh water in the global climate system.

At the same time, measurements of alkalinity, total carbonate, chlorofluorocarbons (CFC's) and other anthropogenic trace gases found in seawater were undertaken to better understand the transport and storage of these gases in the ocean. This work was partly supported by the

Interdepartmental Panel for Energy Research and Development (PERD) program on Climate and CO2. It also contributes to the international Joint Global Ocean Flux Study (JGOFS) examining the role of the oceans in the global carbon budget.

Further work in support of JGOFS was undertaken by Biological Sciences Branch (BSB) through measurements of primary biological production and associated physical and chemical oceanic variables.

Researchers from Dalhousie University Department of Oceanography measured the distribution of methyl chloride and bromoform in seawater to begin to understand the sources for these gases and their linkages with biological activity.

Type of data collected:

Temperature, salinity and dissolved oxygen data were collected using our own CTD instrumentation on all stations, and using up to three trial CTD units on selected stations. Water samples collected by Rosette sampler using 8-liter sampling bottles were analyzed on board ship for salinity, dissolved oxygen, nutrients (phosphate, silicate, nitrate plus nitrite), alkalinity, total carbonate, chlorofluorocarbons (CFC-11, CFC-12, CFC-113), carbon tetrachloride, methyl chloride and bromoform. Station measurements of nutrients, chlorophyll and primary production in the upper 100m were measured with a submersible pump system (BSB). Station measurements of light attenuance and fluorescence were measured by a new design of profiling light meter (BSB). Underway measurements of near surface currents were obtained using an Ametek/Straza acoustic doppler current profiler. Underway measurements of near surface temperature, salinity and fluorescence were made using the ship's sea water intake (BSB). Atmospheric particulates were collected by pumping air through filters for shore-based analysis (Dalhousie University).

Scientific or Survey Accomplishments:
(with statements explaining failures to achieve objectives)

130 CTD stations were occupied along a 5000 nm cruise track.
> 2600 discrete water samples were collected.

Stations were occupied as planned except for the final stations planned on the Labrador Coast where ice conditions made passage impossible. Good coverage was obtained in the East Greenland Current and West Greenland Current in spite of the presence of some ice. Minor hardware problems with our CTD systems meant that a total of three sea units were used, and the final calibration of the data will be correspondingly complicated.

About 2500 determinations of dissolved oxygen and nutrient concentrations.
> 2000 determinations of total carbonate concentrations.
> 1000 determinations of CFC concentrations.
> 1000 determinations of total alkalinity.

Very few problems were associated with the analytical systems themselves. Most problems that did occur were traced to failures of small components. All laboratory measurements were jeopardized to some degree by poor temperature control of the laboratories. Rapid and large changes in temperature caused difficulties with baseline drift and calibration for nutrients, and calibration difficulties together with poorer precision for the CFC, total alkalinity, and total carbonate measurements. Salinity analyses were also affected. The CFC analyses also suffered somewhat because of shipboard CFC-12 contamination.

Biological Sciences were able to make measurements in intensive spring bloom conditions and a unique set of biological and physical measurements were obtained.

The Dalhousie University researchers accomplished one of the first systematic marine surveys for methyl chloride and bromoform. Their future analyses will be well-supported by the physical and biological measurements made on the cruise.

Parameter:	**Scientific Personnel:**
Chief scientist	Dr. R.M. Hendry (902) 426-3142
CTD data	Ocean Circulation Division
	Bedford Institute of Oceanography
chlorofluorocarbons &	Dr. E.P. Jones (902) 426-3869
carbonate chemistry	
nutrients	Mr. P. Clement (902) 426-3669
chlorofluorocarbons	Dr. R. Gershey (902) 426-4147
	Marine Chemistry and Toxicology Division
	Bedford Institute of Oceanography
biological program	Dr. E.P.W. Horne (902) 426-8362
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bromoform chemistry	Dr. R. Tokarczyk (902) 494-3671
methyl chloride chemistry	Ms. V. Tait (902) 494-3671
	Department of Oceanography
	Dalhousie University
	Halifax, Nova Scotia

	CANADA B3H 4J1

Stn	Cast	Start Date	Start Time (UTC)	Latitude deg min	Longitude deg min
A20N - 28 Stations					
2	1	04/27/91	08:34	N 43 14.91	W 50 15.09
29	1	05/04/91	09:15	N 33 0.06	W 50 14.98
A4C - 15 Stations					
30	1	05/04/91	16:43	N 32 59.93	W 49 34.79
44	1	05/08/91	10:15	N 32 59.99	W 40 15.13
AR5 - 62 Stations					
45	1	05/08/91	16:31	N 33 29.94	W 39 46.94
105	1	05/23/91	03:24	N 59 7.05	W 42 12.52
AR7 - 25 Stations					
106	1	05/26/91	16:49	N 60 32.02	W 48 5.17
130	1	05/31/91	21:16	N 54 54.98	W 54 2.82